

REMARKS

This Application has been carefully reviewed in light of the Office Action mailed February 4, 2005. Applicants respectfully request reconsideration and favorable action in this case in view of the following remarks.

Section 103(a) Rejections

The Office Action rejects Claims 1-37 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Publication No. 2003/0061091 issued to Amaratunga et al. ("*Amaratunga*") and in view of U.S. Patent No. 6,216,956 issued to Ehlers et al ("*Ehlers*"). Applicants respectfully traverse these rejections for the reasons stated below.

Applicants reiterate the arguments of the previous response with reproducing them. In addition, please note the following reasons why one skilled in the art would not be motivated to combine *Amaratunga* and *Ehlers*. As discussed in the previous response, *Amaratunga* is directed towards a process in an industrial facility that utilizes a transfer function that is developed and modified based on regression rather than from physical principles, while *Ehlers* is directed towards an environmental control process for buildings, which collects both environmental data and energy consumption data to determine the extent to which internal temperature settings should be increased or decreased to reduce energy use. The differences between industrial facility systems control and HVAC control are substantial.

For example, the transfer function techniques taught by *Amaratunga* are developed for use in the industrial environment. Transfer function techniques work well in the sensor rich environment of industrial energy consuming systems, such as the one in *Amaratunga*, but they are inappropriate in building HVAC systems, such as the one *Ehlers*. Buildings have a sparsity of sensors that require totally different diagnostic and optimization techniques to function. There is also sufficient autocorrelation between coupled variables in building HVAC systems that transfer function techniques often produce unreliable models. For example, transfer function techniques have lead to models that indicate that leaving window shades open on a sunny day will minimize cooling energy use – exactly the opposite of what needs to occur to minimize energy use. Thus, *Amaratunga* would require new diagnostic and optimization techniques to function in the sparse sensor environment of a building and would also require adopting new modeling techniques before the methods that *Amaratunga* taught

could be applied in buildings. Hence, combining the teachings of *Ehlers* with *Amaratunga* would change the principle of operation of *Amaratunga*, which is not allowed. (See MPEP 2143.01).

Hence, for at these additional reasons, a *prima facie* case of obviousness cannot be maintained with respect to Claims 1-37, as the Examiner has not shown the requisite proof necessary to establish a suggestion or motivation to combine *Amaratunga* and *Ehlers*. Applicants respectfully request reconsideration and allowance of Claims 1-37.

In addition to depending from independent Claims 1 and 15, respectively, which are shown above to be allowable, Claims 7 and 20 are also allowable because they each contain additional limitations not disclosed by *Amaratunga* or *Ehlers*. For example, Claim 7 recites, “a validation engine residing in the memory and executable by the processor, the validation engine operable to validate the energy consumption data.”

As described in the previous response, *Amaratunga* never mentions validation of his data, but the Examiner asserts that “the reference strongly suggests and teaches validation of energy consumption in order to determine if the energy consumption system is operating efficiently and energy consumption amount is consistent with what bench marked.” (Office Action, at pages 18-19).

Robert C. Sonderegger, Ph.D., Director, Modeling and Simulation, Itron, Inc. and a former chairman of the Energy Calculations Technical Committee of the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) is a leading developer of sophisticated energy management software and an internationally known expert on analysis of measured building energy data and simulation of building energy performance. One of the inventors of the instant application (D. Claridge) is also an internationally known expert on energy management and analysis of measured building energy data. Mr. Claridge was recently asked to serve as a peer reviewer on a paper written by Dr. Sonderegger titled “Validating, Editing and Estimating Millions of Utility Bills” that was submitted for publication in *ASHRAE Transactions*.

This paper presents the only systematic method suitable for automated validation of utility bills that Claridge has seen presented for publication in the literature. In the introduction to this paper, Sonderegger states:

“Most research to date has been based on relatively small numbers of

utility bills (dozens, or hundreds, occasionally thousands). Identification and correction of outlier utility bills can therefore be done by “eyeballing” utility bills after plotting them against time or against outdoor temperature. Where hourly data has been used instead of monthly, graphic techniques have been suggested to make identification and correction of bad data more efficient (Haberl and Abbas 1998). To the knowledge of this author, more systematic techniques have not been developed.”

Thus one highly skilled in the art has stated that “more systematic techniques,” such as those claimed in the instant application have not been reported in the literature as of 2005.

ASHRAE is the pre-eminent technical society for engineers working in energy management in buildings. Applicants’ specification (e.g., page 18, lines 16-19) states “[t]he validation engine 122 is used to validate the energy consumption information of the facility 12 to ensure that the energy consumption information is complete and accurate.” Part of this function is determining an appropriate value to insert to ensure completeness if it is determined that specific data is missing or is inaccurate. This is a need that two separate ASHRAE Technical Committees (TC 4.7 Energy Calculations and TC 4.2 Climatic Informations) have recognized. A subcommittee recognized this need over two years ago, and developed a Research Topic Acceptance Request (RTAR) Form for a prospective ASHRAE research project titled “Developing Standard Procedures for Filling Weather Data Gaps during Analysis of Measured Building Energy Use”. This section of this RTAR describing the need for the proposed research states:

“These procedures (diagnosis of existing energy performance and evaluation of energy conservation efforts) generally require the use of some combination of energy and weather data. This data is increasingly being collected by the local EMCS and is normally collected at 15-minute or hourly intervals, although analysis is typically done at longer intervals by aggregating the data to daily averages or totals. Short gaps are common in such data. This is even true in feeds of hourly weather data from the National Weather Service where 100-200 hours of missing data scattered through a year are common.

To date, data-filling techniques for missing measured weather data have been done on an ad hoc basis during the course of data processing. None of the interpolation techniques tried were found to be satisfactory except when looking at highly aggregate results with hundreds or thousands of filled gaps. One of the more counter-intuitive results to data is that simple linear interpolation is considerably more accurate for filling gaps in hourly cooling and heating consumption data than techniques that consider linear dependence on temperature. More systematic methods, such as estimating

missing data from other available climatic parameters, interpolation from other weather stations, historical records, etc., have not been attempted. The development and documentation of such procedures would be valuable in any building energy analysis that involves the use of measured energy consumption and weather data.”

Both Technical Committees endorsed this RTAR expressing the need for research on this topic at the ASHRAE Annual Meeting held in Denver, CO, June 26-29, 2005. Hence, the relevant technical committees of the leading engineering organization dealing with energy management in buildings have gone on record in June of 2005 stating that systematic methods for filling weather data are needed.

Therefore, it is not explicit, implicit, or inherent in *Amaratunga* that a validation method is utilized in his invention. For at least this additional reason, a *prima facie* case of obviousness cannot be maintained with respect to Claims 7 and 20, because the cited references fail to disclose each and every limitation of Claims 7 and 20. Therefore, Applicants respectfully request reconsideration and allowance of Claims 7 and 20.

In addition to depending from independent Claims 1, 15 and 28, respectively, which are shown above to be allowable, Claims 11, 25 and 31 are also allowable because they each contain additional limitations not disclosed by *Amaratunga* or *Ehlers*. For example, Claim 11 recites, “the control engine is further operable to modify a variable rate of energy consumption data collection at the facility.” In *Amaratunga*’s statement at the end of para. 0047 “where a feedback control capability has been built into the energy consumption predicting system, data processing module 20 may take action on the most likely causes in an attempt to bring the energy consuming system toward a more efficient state in step S7.” *Amaratunga* does not mention or even allude to modifying a variable rate of data collection in the reference cited.

For at least this additional reason, a *prima facie* case of obviousness cannot be maintained with respect to Claims 11, 25 and 31, because the cited references fail to disclose each and every limitation of Claims 11, 25 and 31. Therefore, Applicants respectfully request reconsideration and allowance of Claims 11, 25 and 31.

CONCLUSIONS

Applicants have made an earnest attempt to place this case in condition for allowance. For the foregoing reasons, and for other apparent reasons, Applicants respectfully request full allowance of all pending Claims. If the Examiner feels that a telephone conference or an interview would advance prosecution of this Application in any manner, the undersigned attorney for Applicants stands ready to conduct such a conference at the convenience of the Examiner.

Applicant hereby takes an Extension of Time for responding to the Examiner's Office Action dated February 4, 2005 for two (2) months from May 4, 2005 to July 4, 2005. A separate Notification of Extension of Time Under 37 C.F.R. §1.136, along with a check in the amount of \$225.00 for small entity is hereby attached.

Applicants believe no other fee is due. However, should there be a fee discrepancy, the Commissioner is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. 02-0384 of Baker Botts L.L.P.

Respectfully submitted,

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